LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-47 (canceled)

48. (currently amended) A method for aligning and mounting at least one surface-emitting laser with respect to at least one edge-receiving optical device, the method comprising the steps of:

(a) providing an optical bench substrate having a mounting surface in the x-y coordinate plane, the mounting surface having a plurality of alignment features defined therein, the optical bench substrate having at least one edge-receiving optical device mounted on the mounting surface, wherein:

each of the at least one edge-receiving optical device has an input edge in the x-z coordinate plane, each said input edge being perpendicular to both the mounting surface and to the substrate of the at least one edge-receiving optical device, whereby each of the at least one edge-receiving optical device is adapted to receive light traveling in the y direction into its input edge;

each of the at least one edge-receiving optical device is for conditioning light traveling in the y-direction and received at its input edge;

the at least one surface-emitting laser comprises a primary epi surface from which laser radiation is emitted in a direction perpendicular to the primary epi surface ~~and~~, a mounting edge perpendicular to the primary epi surface, and an active region parallel to the primary epi surface and perpendicular to the direction in which the laser radiation is emitted; and

the plurality of alignment features are for receiving the mounting edge of the at least one surface-emitting laser and for securing the at least one surface-emitting laser from movement in the x direction and in the y direction; and

(b) mounting the at least one surface-emitting laser, at its mounting edge, on the mounting surface and within said plurality of alignment features so that the at least

one surface-emitting laser is secured from movement in the x direction and in the y direction, wherein the plurality of alignment features are positioned on said mounting surface with respect to the at least one edge-receiving optical device so that: the primary epi surface of the at least one surface-emitting laser is in the x-z coordinate plane and the at least one surface-emitting laser, when activated, will emit laser radiation in the y direction and into the input edge of the at least one edge-receiving optical device, respectively, whereby the at least-one surface-emitting laser is directly optically coupled to the at least one edge-receiving optical device, respectively.

49. (previously added) The method of claim 48, wherein the plurality of alignment features comprise a pair of x-direction stops for securing from movement in the x direction and a pair of y direction stops, the pair of x direction stops bounding the mounting edge and for securing the at least one surface-emitting laser from movement in the x direction and the pair of y direction stops bounding the mounting edge and for securing the at least one surface-emitting laser from movement in the y direction.

50. (previously added) The method of claim 48, wherein the at least one surface-emitting laser comprises an array of surface-emitting lasers and the at least one edge-receiving optical device comprises a corresponding array of edge-receiving optical devices having one edge-receiving optical device for each respective surface-emitting laser.

51. (previously added) The method of claim 48, wherein step (b) comprises the step of mounting the at least one surface-emitting laser, at its mounting edge, on the mounting surface by use of solder or epoxy.

52. (previously added) The method of claim 48, wherein step (a) comprises the step of photolithographically fabricating the plurality of alignment features in the mounting surface.

53. (previously added) The method of claim 48, wherein step (a) comprises the step of

fabricating the plurality of alignment features in the mounting surface using electron beam lithography.

54. (previously added) The method of claim 48, wherein the edge-receiving optical devices of the at least one edge-receiving optical device are edge-receiving optical modulators.

55. (previously added) The method of claim 54, wherein each of the at least one edge-receiving optical device further comprises an edge-receiving optical amplifier positioned in the path of the output signal from said each edge-receiving optical modulator.

56. (previously added) The method of claim 48, wherein the edge-receiving optical devices of the at least one edge-receiving optical device are edge-receiving optical amplifiers.

57. (previously added) The method of claim 48, wherein the edge-receiving optical devices of the at least one edge-receiving optical device are semiconductor optical amplifiers (SOAs).

58. (previously added) The method of claim 48, wherein each of the at least one surface-emitting laser is a vertical-cavity surface-emitting laser (VCSEL).

59. (previously added) The method of claim 48, wherein the optical bench substrate is a silicon optical bench.

60. (previously added) The method of claim 48, wherein step (a) comprises the step of monolithically fabricating the at least one edge-receiving optical device on the mounting surface of the optical bench substrate.

61. (previously added) The method of claim 48, wherein step (a) comprises the steps of:

photolithographically fabricating the plurality of alignment features in the mounting surface;

photolithographically fabricating a second plurality of alignment features in the mounting surface;

fabricating the at least one edge-receiving optical device independently of the optical bench substrate; and

mounting the at least one edge-receiving optical device on the mounting surface of the optical bench substrate, in the second plurality of alignment features.

62. (currently amended) An apparatus comprising:

(a) an optical bench substrate having a mounting surface in the x-y coordinate plane;

(b) at least one edge-receiving optical device mounted on the mounting surface, wherein:

each of the at least one edge-receiving optical device has an input edge in the x-z coordinate plane, each said input edge being perpendicular to both the mounting surface and to the substrate of the at least one edge-receiving optical device, whereby each of the at least one edge-receiving optical device is adapted to receive light traveling in the y direction into its input edge; and

each of the at least one edge-receiving optical device is for conditioning light traveling in the y-direction and received at its input edge; and

(c) at least one surface-emitting laser having a primary epi surface from which laser radiation is emitted in a direction perpendicular to the primary epi surface ~~and~~, a mounting edge perpendicular to the primary epi surface, and an active region parallel to the primary epi surface and perpendicular to the direction in which the laser radiation is emitted, the at least one surface-emitting laser being mounted at its mounting edge on the mounting surface, and positioned with respect to the at least one edge-receiving optical device, so that the primary epi surface of the at least one surface-emitting laser is in the x-z coordinate plane and the at least one surface-emitting laser, when activated, will emit laser radiation in the y direction and into the input edge of the at least one edge-receiving optical device, respectively, whereby the at least-one surface-emitting laser is directly optically coupled to the at least one edge-receiving optical device, respectively.

63. (previously added) The apparatus of claim 62, wherein the at least one edge-receiving optical device is monolithically fabricated on the optical bench substrate.

64. (previously added) The apparatus of claim 62, wherein the mounting surface has a plurality of alignment features defined therein and the at least one surface-emitting laser is mounted at its mounting edge in the plurality of alignment features.

65. (previously added) The apparatus of claim 62, wherein the at least one surface-emitting laser comprises an array of surface-emitting lasers and the at least one edge-receiving optical device comprises a corresponding array of edge-receiving optical devices having one edge-receiving optical device for each respective surface-emitting laser.

66. (previously added) The apparatus of claim 62, wherein the edge-receiving optical devices of the at least one edge-receiving optical device are edge-receiving optical modulators.

67. (previously added) The apparatus of claim 66, wherein each of the at least one edge-receiving optical device further comprises an edge-receiving optical amplifier positioned in the path of the output signal from said each edge-receiving optical modulator.

68. (previously added) The apparatus of claim 62, wherein the edge-receiving optical devices of the at least one edge-receiving optical device are edge-receiving optical amplifiers.

69. (previously added) The apparatus of claim 62, wherein the edge-receiving optical devices of the at least one edge-receiving optical device are semiconductor optical amplifiers (SOAs).

70. (previously added) The apparatus of claim 62, wherein each of the at least one surface-emitting laser is a VCSEL.

71. (previously added) The apparatus of claim 62, wherein the optical bench substrate is a silicon optical bench.

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72. (canceled)